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ABSTRACT

This study was designed to find out how far suggested textbooks have been adopted in teaching a new chemistry syllabus in Kenya and if the chemistry books now being used in schools to teach the new syllabus involve activity and encourage the process of scientific inquiry. The new syllabus is a merger between the traditional separate chemistry syllabus and the Secondary Science Project chemistry syllabus. Data were obtained by means of three instruments (included in appendices): a student questionnaire, a teacher questionnaire, and a textbook rating sheet. Among the results reported are those indicating that the 10 teachers surveyed did not know of an established procedure and criteria for recommending and selecting textbooks, that only three of the six suggested books were found in the schools investigated, and that for both teachers and students, the major role of the textbook is that of providing information. Two of the recommendations offered suggest the need to decentralize the procedure for recommending books at the school level to involve all teachers, and to conduct a more exhaustive evaluation of the chemistry course to determine if objectives are being met and the kinds of problems hindering their successful implementation. (JN)

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Relevance of Suggested Textbooks For the Teaching of New Chemistry Syllabus in Kenya Secondary Schools.

APC Project

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This research project was undertaken as part of a training programme jointly organised on behalf of the African Curriculum Organisation (ACO) by the Kenya Institute of Education (KIE), the University of Nairobi, and the German Agency for Technical Cooperation (GTZ).

INVESTIGATING THE RELEVANCE OF SOME SUGGESTED TEXTBOOKS FOR THE TEACHING OF THE NEW CHEMISTRY SYLLABUS IN KENYAN SECONDARY SCHOOLS.

BY

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JULY 1976

SUBMITTED TO THE FACULTY OF EDUCATION OF THE UNIVERSITY OF NAIROBI IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE POST GRADUATE DIPLOMA IN CURRICULUM DEVELOPMENT

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Kenya Institute of Education — Joel A. Ochola
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CHAPTER 1

STATEMENT OF THE PROBLEM

1.1. BACKGROUND INFORMATION

The new combined secondary chemistry syllabus in Kenya will be examined for the first time at the end of 1983. The syllabus is a merger between the traditional separate chemistry syllabus and the secondary science project (SSP) chemistry syllabus.

The move to revise and combine these two syllabuses was initiated sometime in 1976 and the exercise was completed, and the new syllabus introduced to schools by January 1980. The first cohort of students taking this combined course are presently in their fourth form and preparing to take their first examination in this course.

The need to revise and combine these syllabuses was prompted by the following two factors:

1. There was a growing concern in the educational circles in Kenya about the large number of science syllabuses that were being offered in schools by that time. For instance in 1974 there was a total of ten science syllabuses which were offered in schools, and in chemistry alone the following courses were pursued:

Chemistry Course	Examination Code Number
1. Traditional	542
2. SSP	548
3. SSP Physics-with-SSP Chemistry	571
4. Physical Science	561
5. General Science	500

The argument advanced for combining these syllabuses was that the students were being prepared to take up positions and live in the same society. They should therefore be exposed, as far as possible, to similar experiences in the schools. There was a call to rationalize the courses offered in each subject area by amalgamating them as much as possible in order to avoid unecessary duplications and provide uniform syllabuses in Kenyan schools. All science subjects were affected by this call and the pressure for further rationalization is still on.

2. The second factor was the growing dissatisfaction with certain aspects of the syllabuses and the inconsistency of the performance of students in their 'O' and 'A' level examinations. Some general observations made about the syllabuses included the following:

(i) the 548 course demanded a lot of laboratory facilities which most schools could not easily aquire or properly maintain. The course, therefore, could not be taught as was originally anticipated.

(ii) the teachers found it rather difficult to handle the 548 course as they were not properly prepared for it in their training. In several cases they tended to depend heavily on the course materials and some teachers just taught the course in the traditional manner.

(iii) the 'O' level results showed that those who pursued the 548 course performed significantly better than those who had pursued the 542 course. A summary of the 'O' level results of the 542 and 548 courses between 1973 and 1976 is shown on the table below:

TABLE 1 1973-1976 SCHOOL CERTIFICATE GRADE DISTRIBUTION OF CHEMISTRY 542 AND 548 SYLLABUSES

Year	Syllabus	Number of Candidates	% of candidates Obtaining Grades.			
			1-2	1-6	7-8	9
1973	Chemistry (542)	1038	6.9	55.2	17.0	27.8
1974		1819	6.7	52.8	17.7	29.5
1975		2147	7.3	53.0	20.3	26.7
1976		2577	7.1	50.9	19.1	30.0
1973	Chemistry (548)	1147	4.5	61.0	20.7	18.4
1974		1242	7.0	55.0	24.2	20.8
1975		1167	8.1	59.5	21.9	18.1
1976		1230	9.1	63.0	20.3	16.7

From the table it can be noted that:

(a) % grades 1-2 (Distinction) greater for 548

(b) % grades 1-6 (Credit) greater for 548

(c) % failures (Grade 9) smaller for 548

(iii) the 'A' level results on the other hand showed that the 542 candidates performed better on theory papers whereas the 548 candidates excelled in the practicals.

In order to understand the origins of these shortcomings and in consistencies a brief survey of the historical and philosophical background of these syllabuses is necessary.

Since the late 50 s there emerged a shift in emphasis in the meaning of Science and the method by which it had to be taught to students. Traditionally science had been identified with a body of facts divided into various definite subject matter areas. As long as the student had acquired this body of facts he was considered to have learnt science. The role of the teacher in this exercise was simply to impart this body of facts to the student by providing him with information through the "talk-chalk"method. Apart from the teacher, the textbook was the other major source of information to the student. Experimental investigation by the student was minimal and as William Rowe in his "Inquiry Techniques For Teaching Science" rightly puts it:

"The text and teacher assume the roles of authorities and dispensers of information"[1].

The laboratory was a place for confirming the theories and information proposed by the text and the teacher. The method of teaching, thereby, did very little to develop any scientific thought processes.

It later became clear that this was not a conception of the true science. New ideas about science evolved; the true science was seen as one involving observational, experimental and laboratory-oriented methods in the process of learning and solving problems as they arise not only in the classroom but also in life generally.

In this context the learner is an active investigator in the process. He does not have to rely on any authority for conclusions; he gathers information and uses them to make hypotheses which he can test and decide, on the basis of his findings, what kind of conclusions and generalisations to arrive at. He uses the facts from the text and teacher not as absolute truths

1. William D. Romey. "Inquiry Techniques For Teaching Science" Prentice - Hall Inc, 1968, P.20.

but rather as means of reaching for new knowledge. The learner thus develops an inquiring mind, and the process is termed scientific inquiry. Several other labels have been used to denote this process; these include, "Scientific method", "discovery method" and "activity method."

The process is characterised by several steps as follows:

(i) Observation

(ii) Problem identification

(ii) Theory building, prediction

(iv) Experimentation and further observation

(v) Analysis, comparison of theory with observation and results of experimentation.

(vi) Drawing conclusions and generalizations.[2]

This method has since dominated the whole process of science teaching including the selection and use of instructional materials.

One organisation that championed the return to true science was the Nuffield Foundation of Britain. It produced a lot of materials not only in science but also in Mathematics and technol...

2. Clayton D.E.B, "Source Book for Science Teachers", SEPA, P.9.

The ideas and methods developed by the Foundation were disseminated widely all over the world and helped start similar projects in various parts of the world. The Secondary Science Project was thus an offshoot of the Nuffield Project. It was an adaptation of the Nuffield Project to the East African situation. The philosophy of the SSP however remained the same with that of the Nuffield Project.

Alot of materials were prepared for the trials and final adoption of the SSP, Pupil workbooks and teachers' guides were written for all the secondary Forms 1 to 4. Unlike the traditional course where students had to take a practical examination at the end of Form 4, the SSP students were expected to have done sufficient experimental work that they were exempted from such practical examination.

The chemistry 542 syllabus on the other hand was a relic of the traditional method of science teaching that was outlined earlier. The course entailed a slightly greater content load than the SSP course and its coverage was more rigorous. No specific materials were prepared for teaching it and the texts were acquired on recommendations from the Ministry of Education.

A comparative examination of the two syllabuses was made through the National Chemistry Panel at the Kenya Institute of Education (KIE) and it was felt that the two syllabuses would greatly reinforce one another if they were combined into one. In the new syllabus, therefore, one finds both, the rigorous content treatment of the traditional syllabus and the experimental approach of the SSP. An introductory statement of this new syllabus bears this out.

> "A good deal of the content will be familiar to teachers but the treatment must be based on practical investigation whenever possible ... a large proportion of the examination questions will require a knowledge and understanding of practical situations ..... Candidates will be at a distinct disadvantage if their chemistry teacher has not adopted a "practical approach" in his teaching ....."[3]

The new syllabus lays alot of emphasis on the "Practical approach".

---

3. Quoted from the 'Introduction' to the course outline of the new chemistry syllabus.

Now, with the development of the new syllabus it became necessary to find suitable resource materials that could be used to aid the teaching and learning of chemistry in the new syllabus. The sort of materials envisaged were neither the sketchy workbooks of the SSP nor the information-ladden books of the traditonal syllabus, but something incorporating both.

Since there was no time to develop and try out materials as was done with the SSP, a set of textbooks was selected to be used with the new syllabus. It was hoped that the schools adopting the new syllabus would purchase at least one of the suggested books and use them as texts. The workbooks and texts used with the previous two syllabuses were supposed to be withdrawn and used only for reference purposes. A list of the suggested textbooks is given below:

	Title	Author	Publisher
1.	Discovering Chemistry. (1-4+ teachers' Guide)	Atherton N.A. and Lawrence J.K.	J. Murray
2.	Investigating Chemistry.	Davies I. etal	Heinemann Ed.
3.	Chemistry by Experiment and Understanding.	Gerrish J. and Manfield D.	M^{c}Graw-Hill

5.	Introduction to Modern Chemistry	Abbot D.	Hulton Ed.
6.	Chemistry by concept.	Spiers D. and Stebbens D.	Heinemann Ed.

1.2. PROBLEM ANALYSIS

The Commonwealth Carribean Working Party on Textbook Evaluation defined textbooks as:

> "Materials prepared or chosen with the intention of serving as principal means of achieving specific curriculum objectives"[4].

In line with this definition the Party maintained that all books, in addition to those intended by the publishers to be textbooks, regardless of their length or character, become textbooks if they are selected as a chief source of instruction for a particular unit in an educational programme.

The selection of any textbook is therefore an important task that should be performed in a systematic way by a competent group of specific and appropriate composition.

Usually criteria are established against which competing materials are evaluated and suitable ones selected. Such criteria generally address themselves to two broad characteristics of any

4. The commonwealth Carribean Working Party on Textbook Evaluation, 'A check-list of criteria for Evaluating Textbooks", 1973 P.1.

   Note. this check-list was revised and adopted by Commonwealth African Book Development Seminar held at Ibadan in February 1975.

material namely:-

- the material as an instructional tool and the
- physical and practical characteristics of the material.

The format and depth of presentation of these criteria vary with authors and groups that use them and it is not necessary to outline all of them.

As an instructional tool a whole range of questions form the basis of developing the criteria forevaluation and selection. Some of these questions as given by Hans O. Andersen, in his book 'Readings in Science Education for the Secondary Schools' include the following:

1. How well does the book achieve the objectives of the course?
2. How well does the book give satisfactory coverage to subject matter?
3. How satisfactory is organisation of material for effective learning and for course of study?
4. How effective is the material for student interest?
5. How appropriate is vocabulary and style of presentation for students for whom intended?
6. How accurate and up-to-date are contents?
7. How helpful to the learning process are the illustrative materials?

8. How adequate are the study aids, suggested activities, bibliographies and other teaching aids?[5].

In addition to these, and particularly for the selection of science materials, the criteria should incorporate two other major factors.

1. Factors which deal with the development of non-content objectives which include the development of appreciation and attitudes: problem-solving approach; skills of learning science; the role of science in society and scientific literacy; and transfer of learning.

2. Factors which deal with experiments, demonstrations and activities, for instance, inquiry of verification approach; student participation, activity and investigation; use of simple materials; emphasis on drawing conclusions on the basis of observation and experimentation; feedback and appropriate practice for students.

The Carribean Party recommended that there should be two committees to evaluate and select books; at the school level and also at the National level.

The school committee might consist of the form teacher, a specialist in the subject matter of the book, subject specialists in related fields, a specialist in language teaching, the teachers of the forms below and above the form that will be using the book and a representative of the parents. Opinion of the pupils should also be sought if the book has previously been used in the school.

5. Hans. O. Andersen, "Readings in Science Education for the Secondary Schools" P.254-226.

The National Committee might consist of the following categories of people: the Chief Education Officer, representatives of subject organisations or associations; curriculum officers and inspectors; representatives of teachers' colleges and universities; an educational psychologist; a printer; an illustrator or book designer, a representative of the publishers association; a school principal, a language expert, and parents.

In Kenya the responsibility of selecting and recommending textbooks is vested with the various National Subject Panels at K.I.E. This is specified as one of the basic functions of the panels:

> "To review and recommend books for use in schools and teachers' colleges in the relevant subject or curriculum area "[6].

The composition of these panels is much smaller and less diversified compared to the National textbook committee recommended by the Carribean Party and in general the attendance during the Panel meetings tend to be confined to those members

6. Kenya Institute of Education, "Terms of Reference of Panels", 1977, P.5.

in the vicinity of Nairobi. Furthermore sometimes there is no guideline for the selection of textbooks and whichever book is selected depends not on any rating but rather on the direction of the debate during the Panel Meeting. The possibility of outside influence is not ruled out as a determiner of what books are chosen. In the whole exercise the subject inspector plays a leading role as he is the chairman of the National Subject Panel, and is also the one whom the Chief Inspector of Schools would eventually consult before the selected books are finally ratified by the Inspectorate.

From this it can be seen that the Kenyan mechanism for textbook selection is not very comprehensive and is indeed suspect to the extent that some schools ignore the recommended books and instead buy their own; which is worse since there are no school textbook selection committees and such purchases are done on the strength of the recommendation of a single teacher only.

Sometime in 1982 the role of KIE in recommending textbooks was seriously questioned by the Head of State. The Ministry of Higher Education subsequently suspended the recommendation of books by the panels and declared that a National Committee would be established for that purpose.

It is not known if that committee was formed but somehow the Inspectorate continues to be the organ recommending books.

It is also suspected that for various reasons some schools may have continued using the textbooks and materials from the previous syllabuses, in which case the new sullabus may not be receiving a uniform implementation with respect to textbooks.

1.3. PURPOSE OF STUDY

In view of the issues brought out earlier in this chapter and considering the tendency of human beings to resist change, and in view of the difficulties involved in recommending comprehensive textbooks for a course, this study intends to find out how far the suggested textbooks have been adopted in teaching the new chemistry syllabus. The study secondly, would determine if the chemistry books being used in schools to teach the new syllabus involve activity and encourage the process of scientific inquiry.

The specific questions underlying this study were as follows:

1. Do the teachers appreciate the changed emphasis in the new chemistry syllabus?
2. What mechanisms exist now for the selection of secondary school textbooks in Kenya?
3. Are these mechanisms functional?
4. Are the teachers aware of the criteria for selecting textbooks?

5. Are there sufficient chemistry textbooks for each child in the schools?

6. Which of the suggested textbooks is most common in schools?

7. How suitable are the suggested books for the new syllabus?

8. How useful is the textbook in the teaching and learning of chemistry?

9. Should the textbooks be supplied to students or should they be confined solely with the teachers?

1.4 SIGNIFICANCE OF STUDY

The 'Curriculum Guide for Secondary Schools' has this to say on the role of textbooks in the teaching of science.

> "The role of the textbook in the teaching of science is of great importance to a teacher. A good textbook should not only provide basic information on various aspects of sience, but should also indicate the structure of a teaching approach to the subject"[7].

The study seeks to establish the structure of the teaching approach indicated in the suggested chemistry books as it is believed that the approach can exert alot of influence on the way the teachers handle the new course and the manner in which the students learn. The approach contained in the new syllabus is the 'practical approach'. It is imperative, therefore to ensure that the suggested textbooks do, infact, reinforce this approach. It is further anticipated that

7. Kenya Government,"Curriculum Guide for secondary schools" Vol 2. P.72.

the study will assist teachers and students to use textbooks more critically without adhering to them faithfully to draw conclusions that have not been tested.

The results of the study will also be valuable to the curriculum developer inasmuch as the results would provide a basis for change of the instructional materials and establish a need to compile other instructional materials to replace or supplement those currently used in schools.

1.5. REVIEW OF LITERATURE

The role of the textbook in the teaching-learning process is a controversial issue among educationists the world over. Varied opinions exist about the proper use of the textbook and in particular two devergent views have been expressed about the use of the textbook as a teaching-learning aid.

There are those advocates for the use of the textbook who maintain that the textbook is a necessary component in the teaching-learning process, which has, for generations, provided what to learn and how the teaching is sequenced.

At the other pole are the critics opposed to what they regard as the"veneration of the textbook "[8], which they blame for the poor quality education in schools.

Summarised below are some of the arguments advanced by both the protagonists and antagonists of the textbook. These arguments

8. Ruth Ann Davies, "The school Library Media Centre: a Force for Educational Excellence". P.7.

are presented by R. Murray Thomas and Sherwin G. Swar tout in their book "Integrated teaching materials"[9]

The arguments presented by the textbook advocates run as follows:

1. Materials can be organised a head of time
   Since what is taught does not change radically and frequently, it can be determined before time by selected experts.

2. Facts are more accurate.
   Since these facts are accummulated by experts over long periods of time using better facilities than teachers they are likely to be more accurate.

3. Materials are organised more carefully to promote learning and this organsation takes into consideration the developmental stages of the learners.

4. It is possible to provide for continuity in the treatment of the content between

9. Murray Thomas R. and Sherwin Swartout G. "Integrated Teaching Materials", P.55-67

the various grades.

5. <u>The basic learning materials are contained in a single book.</u> The learner is therefore saved the problem of having to seek information from other references and from the library especially where such facilities are not properly organised.

The advocates contend that these are sufficient reasons for the continued use of textbooks in schools.

The critics on the other hand present the following arguments:

1. <u>Preplanned subject matter is often undesirable.</u>

   They point that in teaching, focus should be on the common problems teachers and students encounter. Since such problems and their order cannot be forseen, the textbook is useless as an aid. They go further by saying that in most cases the textbooks speak as authorities presenting final answers to questions; and by so providing facts they stiffle the development of thought.

2. <u>Textbooks fail to care for individual differences.</u>

   All the pupils in a class use the same textbook which is usually prepared with some 'average' student in mind. The practice is however that some students may be gaining very little from a book whereas the others may find the same book boring.

3. Texts may include bias and outdated material.

Since a textbook is written from a point of view, the interest and inclination of the author will determine where and what to emphasise. At the same time there are areas where the subject matter may change faster than the rate at which textbooks are changed in schools with the result that the materials in the books become obsolete.

For these reasons the critics suggest that textbooks may not be the most desirable learning materials.

Inspite of these differences of opinion, however, the textbook continues to be the most widely used instructional material in all our schools; and for a science class it is more probable to find a higher ratio between books and pupils than between the laboratory facilities and pupils. This makes it the more important that teachers and students learn how to use the textbook more creatively than hitherto; for in the final anaylsis the textbook is as good as the user. This point is emphasised again by William Romey (P.48) when he says that:

> 'A very good teacher can use almost any textbook to good advantage. A highly discovery-oriented course can be run using the most traditional of textbooks if the teacher spends most of his class-time on experiments and activities and uses the text as something to examine critically rather than as an authority upon which students base their conclusion.' [10]

10 Ibid; P.48

Romey argues further that in science these issues are more critical as there is no "absolute truth". He says that:-

> "The degree of truth of a proposition is proportional to the number of pieces of supporting data that serve as evidence in favour of the proposition"[11].

On this score he attacks the average science textbook as being:-

> "a compendium of scientific conclusions with few supporting data"[12]

and he warns that:-

> "following such a book chapter by chapter question by question commonly leads to authoritarianism on the part of the teacher and to blind acceptance and rote learning on the part of the student. Strict adherence to a textbook leads students to think

11 Ibid; P.41

12 Ibid; P.41.

that science comes from textbooks rather than from observation, experimentation, data analysis, and conclusion"[13].

He however concedes in the same breath that

> "Textbooks, of course, have their uses, but they must be used intelligently. The teacher must analyse exactly what the role of the textbook will be in his course, and he must re-evaluate periodically just how well the textbook is serving him"[14]

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13 Ibid; P.41

14;Ibid; P.41

CHAPTER 2

METHODOLOGY

2.1 INTRODUCTION

Due to time and financial limitations the study was confined to Nairobi Province alone. It is therefore obvious that the results of this study are limited and cannot be used to generalise to all schools in the country. However, it is hoped that these findings are valuable indicators of the situation pertaining in schools in the country.

2.2 TARGET POPULATION

The target population for this study comprised of students and chemistry teachers in those secondary schools within Nairobi that, up till 1983, offered either the traditional separate chemistry or the S.S.P. chemistry courses. These are the schools that were affected by the merger and are using the new combined chemistry syllabus.

2.3 PROCEDURE FOR SELECTING THE SAMPLE:

Secondary schools in Kenya fall into four major types as follows:

Type of School	Code
Government Maintained	M
Government Aided	A
Unaided Community	U.C.
Private	P

This categorisation of schools is based on the source of their financial support.

Type - M schools receive all their financial requirements from the Government while type -A schools are assisted by providing them with some teachers who are paid by the Government. Type - U.C. schools are wholly run by racial communities and type -P schools include all those run by private individuals or groups of private individuals.

The procedure that was adopted in selecting the sample consisted of stratifying the schools according to their type as given in the categories. All schools in Nairobi offering the new syllabus were listed alphabetically under each of the four categories, then assigned ordinal numbers. From each of these categories a sample of schools was selected at random using the table of random numbers.

A total of 8 schools were selected from a population of 29 schools. This represented about 25% of the schools taking the new chemistry course. The selection was done such that each category was proportionately represented in the sample. The sample of schools selected in each category is shown in table 2.

TABLE 2: SAMPLE SCHOOLS

School category	Maintained	Aided	Unaided community	Private	Total
School Population	18	4	5	2	29
Sample Schools	5	1	1	1	8

Out of the 5 Maintained schools, 3 were Boys Schools, 1 was a Girls School and 1 was a Mixed School. The 1 Aided School involved in the study was a Boys School. Similarly the Unaided Community School was a Boys School. The Private School involved in the study was a Girls School.

Having sampled the schools it was also necessary to take a sample of the students and chemistry teachers from the sampled schools. Again due to the limitations cited earlier, the study was confined to form 3 students only. 80 students were randomly selected for investigation out of which 72 returned their questionnaires filled for analysis. 47 of these were boys and 25 were girls.

The chemistry teachers selected from each sample school depended on the number of chemistry teachers in the school. The Head of the chemistry Department was an obvious participant if he taught the new chemistry syllabus. In those schools with more than three chemistry teachers the other two were selected by random method. A total of 16 chemistry teachers were finally involved in the study, 10 of which returned their questionnaires duly filled for analysis. 4 of the teachers that responded were males and 6 were females. 7 of the teachers were of graduate level or above. 1 had a Diploma while 2 were S1 teachers. Five of the teachers had a teaching experience of between 2-5 years, four had an experience of between 7-10 years, and one had a teaching experience of more than 20 years.

2.4 INSTRUMENTS FOR COLLECTING DATA

Three types of instruments were used for data collection in this study, two of which were questionnaires:

1. Students' questionnaire and
2. Chemistry Teachers' questionnaire

The teachers' questionnaire consisted of 31 items grouped into 3 sections. Section A of this questionnaire was made up of Precoded items seeking information about the school. Section B consisting of a mixture of Precoded and structured type items sought personal information about the chemistry teachers. In section C a mixture of Precoded, Free Response type and Ranking Scale Response type items were used to obtain information about the new chemistry course offered in the schools and the type of books that the chemistry teachers used to teach it. Some of the items in this section sought the teachers' attitude about the new course and how they acquired and used the chemistry books to teach the course.

The students' questionnaire was similar in structure to that of teachers. It was made up of a total of 18 items including Precoded Ranking Scale and Free Response types.

The third instrument used in this study was a rating sheet for quantitative analysis of the chemistry textbooks used in the schools to teach the new course. The rating sheet was adopted from a chapter in William Romey's "Inquiry Techniques for Teaching Science"[15]. Five aspects of the textbook could be rated and the sheet was accordingly divided into five sections. Each section was accompanied by instructions to be followed in the rating. For instance, Section A which dealt with the rating of the Text, involved reading a block of 25 sentences from 10 pages randomly selected from the textbook. Each sentence was then assigned to one of the given categories, numbered a-j, as interpreted by the teacher. The categories were broadly divided into 2 groups namely, a, b, c, d, and e, f, g, h.

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[15] Ibid; P.44-51.

The latter categories were those which suggested activities thus involving the student in the learning process. The former categories were those which merely presented information to students.

All the sentences of each category were then added up and the ratio of the sum of the two broad groups was calculated as follows:

$$\frac{e+f+g+h}{a+b+c+d}$$

The result obtained gave the index of student involvement for the text. This index varied from one textbook to another and ranged between 0-1+. A very low index indicated that the textbook contains a hig' r ratio of information than activities. A moderat ly igh index for a book on the other hand suggest hat the book contains high proportions of inves ive materials as required by the new chemistry cou . Those books with indices higher than a certain l er however, contain mainly questions and are not itable as teaching materials. These interpret ons are summarised by table 3.

TABLE 3: SCALE FOR INTERPRETING CA ATED INDICES FOR CHEMISTRY TEXTBOOKS

Index	Interpr tion
0	represent virtually no studen volvement
0-0.4	contain few challenges to stu apart from memorization of facts and def ion, therefore primarily authoritarian
1.0	Contain an equal number of st nts requiring no student participation and sta nts requiring some student thought.
1. 5+	contain virtually nothing but stions, therefore provide insufficient data for dents to work with

The three instruments are attached to this paper as appendices I-III.

2.5 ADMINISTRATION OF INSTRUMENTS

The questionnaires and rating sheets were taken to the selected schools and handed to the Heads of the Chemistry Department in the schools. All necessary information regarding the instruments were given to these Heads. They then distributed the teachers' questionnaires and rating sheets to the selected chemistry teachers. After filling the questionnaires and rating sheets the chemistry teachers submitted them to the Head of the Chemistry Department who handed them back to the researcher.

The students' questionnaires were received from the Heads of the Chemistry Department by their form masters. The latter supplied them to the students who filled them under the supervision of the form masters. On completion the form masters collected the questionnaires and handed them back to the Head of the Chemistry Department from whom they were collected by the researcher.

CHAPTER 3

DATA ANALYSIS

3.1 QUESTIONNAIRE RETURNS

Table 4 shows the response received from the sample subjects as expressed in percentage.

Table 4: QUESTIONNAIRE RETURNS

Population	Questionnaire	Schools					
		Maintained	Aided	Unaided Community	Private	Total	%
Teachers I	distributed	13	1	2	1	17	
	received	7	1	1	1	10	58.8
Teachers II	distributed	13	1	2	1	17	
	received	4	1	-	1	6	35.3
Students	distributed	60	10	10	10	90	
	received	52	10	-	10	72	80.0
Total	distributed	86	12	14	12	124	
	received	63	12	1	12	88	71.0

3.2 DATA ANALYSIS

The questionnaires were carefully studied and all the responses to each item tallied and converted into percentages.

A. THE NEW SYLLABUS AND COURSE OUTLINE

In order to teach the new syllabus it was necessary for the schools concerned to have received a copy of the syllabus, showing the content to be taught, and a copy of the course outline showing how the course would be taught. One of the items in the teachers' questionnaire

required them to indicate if their schools possessed:

1. both the new syllabus and course outline
2. only one of the two documents or
3. none of them

The responses are shown in table 5.

TABLE 5: AVAILABILITY OF NEW SYLLABUS AND COURSE OUTLINE IN SCHOOLS

School	Both	Only one	None
Maintained	4	-	1
Aided	-	1	-
Unaided Community	-	1	-
Private	1	-	-
Total	5	2	1
%	62.5%	25%	12.5%

It can be seen from the table that although 62.5% of the schools possessed both the new syllabus and course outline, a significant 12.5% of the schools had none of them and the teachers were relying on other sources for guidance in teaching the new course. It should also be noted that the 25% of the schools specified that they had the syllabus alone without the course outline.

Under the same objective the teachers were asked to freely express their impression of the new course when compared to the previous one. The responses they gave were placed into four different categories:

1. There were those who said that the two courses were similar with but minor differences.

2. The other group observed that the new course had characteristics that made it better than the previous one.

3. Yet there were those who said the new course entailed more problems than the former and therefore is worse.

4. There were also some who did not commit themselves and remained neutral.

Table 6 gives the responses in percentages.

TABLE 6: TEACHERS' IMPRESSION OF THE NEW COURSE AS COMPARED TO THE FORMER COURSE

Respondents / Former courses	Same	Better	Worse	Neutral
SSP	-	-	-	2
Traditional	3	2	2	1
Total	3	2	2	3
%	30%	20%	20%	30%

It can be noted that there is no significant difference between the responses though more varied impressions

have been formed by those teachers formerly in schools that offered the traditional course.

Again under the same objective the usefulness of the course outline in the teaching of the new course was investigated by an item in the teachers' questionnaire. The responses given are shown in table 7.

TABLE 7: ATTITUDE OF TEACHERS REGARDING THE USEFULNESS OF THE COURSE OULTINE IN TEACHING THE NEW COURSE

Respondents	Very Useful		Useful		Limited use		Not useful	
	No.	%	No.	%	No.	%	No.	%
Male	1	16.7	-	-	-	-	-	-
Female	2	33.3	3	50	-	-	-	-
Total	3	50	3	50	-	-	-	-

The table shows that those teachers who possess the course outline consider it a useful document in the teaching of the new course.

B. TEXT AND AUXILIARY BOOKS USED BY THE RESPONDENTS

Two items in the questionnaires required the respondents to specify which chemistry books they used as text and which ones they used as auxiliary book. Table 8 shows some of the more popular books in schools and how they are used.

TABLE 8: ASSESSING THE USE OF SOME CHEMISTRY BOOKS BY SCHOOLS

BOOK TITLE / USE		Certificate Chemistry Atkinson	New Certificate Chemistry Holderness & Lambert	Investigating Chemistry. Davies et al.	Chemistry for Today and Tomorrow Atherton & Lawrence	Chemistry: A New Certificate Approach Bajah & Godman	Modern Certificate Chemistry Doyle	Chemistry by Concept Spiers & Stebbens	Discovering Chemistry (1-4) Atherton & Lawrence	S.S.P. Manuals Jomo Kenyatta Foundation
Number of schools using FOCERLY as Text	NO	4	3	-	-	1	-	-	-	2
	%	50%	37.5%	-	-	12.5%	-	-	-	25%
Number of Schools using NOW as Text	NO	-	1	2	2	1	2	-	-	-
	%	-	12.5%	25%	25%	12.5%	25%	-	-	-
Number of Teachers using as Auxiliary	NO	2	1	2	1	1	-	1	2	1
	%	20%	10%	20%	10%	10%	-	10%	20%	10%
Number of Students Using as Auxiliary	NO	10	16	4	1	-	-	-	-	-
	%	29.4%	47.1%	11.8%	2.9%	-	-	-	-	-

The table shows that only three of the titles suggested in the course outline appear on the table. Of these three, Investigating Chemistry by Davies et al, seems to be the most popular as 25% of the schools use it now as their textbook and 20% of the teachers and 11.8% of the students use it as an auxiliary book. The other two, Chemistry by Concept by Spiers and Stebbens and Discovering Chemistry by Atherton and Lawrence are only used by 10% and 20% respectively, as reference material by teachers.

It is also noticed from the table that New Certificate Chemistry by Holderness and Lambert is still used as a textbook by 25% of the schools and remain the most popular student auxiliary book as 47.1% of them use it. Certificate Chemistry by Atkinson, though formerly used by 50% of the schools as textbook is now only used as an auxiliary book by 20% of the teachers and 29.4% of the students.

Another item on the teachers' questionnaire required them to answer YES or NO to whether they had seen the list of the suggested books given at the back of the course outline. As is seen in table 9, out of the 7 teachers who said they possessed a copy of the course outline, 57.1% answered YES while the other 42.9% had not read it. Those teachers who answered YES were also required to give the name of the book they had selected from the list, for use as textbooks. It is interesting to note from the same table that 50% of those who admitted having read the list of suggested books went ahead and acquired books not on the list at all!

TABLE 9: TEACHERS' RESPONSES WHETHER THEY HAD SEEN THE LIST OF SUGGESTED BOOKS AND ACQUIRED ANY OF THEM

Response	Yes		No	
	NO.	%	NO.	%
Acquired book in the list	2	28.55%	-	-
Acquired some other book	2	28.55%	3	42.9%
Total	4	57.1%	3	42.9%

In order to assess the distribution of text books among students an item was included in both the teachers' and students' questionnaires to which they were required to respond by indicating how many students shared each copy of the text book. The responses are presented in table 10.

TABLE 10: DISTRIBUTION OF TEXTBOOKS AMONG STUDENTS

Number of Students Sharing each book	1		2		3		3+	
	NO.	%	NO.	%	NO.	%	NO.	%
Maintained	22	31.0%	25	35.2%	2	2.8%	2	2.8%
Aided	10	14.1%	-	-	-	-	-	-
Private	10	14.1%	-	-	-	-	-	-
Total	42	59.2%	25	35.2%	2	2.8%	2	2.8%

It is notable that although 31% of the students in Maintained Schools have a textbook to themselves, more than 40% share books amongst them. All the students from the Aided and Private Schools have a book each since they have to buy their own textbooks.

Under the same objective an item was included in the students' questionnaire to find out if they possessed any auxiliary books. Table 11 shows their response.

TABLE 11: ASSESSING AVAILABILITY OF AUXILIARY BOOKS AMONG STUDENTS

Responses	YES		NO	
	No.	%	No.	%
Maintained	22	31.0%	29	40.9%
Aided	5	7.0%	5	7.0%
Private	7	9.9%	3	4.2%
Total	34	47.9%	37	52.1%

Although a good number of students have auxiliary books, as large as 52.1% of the students have none and have to rely solely on their textbooks. It is significant that about 41% of these are to be found in Maintained schools where 40% also share their textbook as seen in table 10.

C. RECOMMENDATION AND SELECTION OF BOOKS BY TEACHERS

In the course of their work teachers are usually called upon to select books for their personal use and also to recommend certain books for their students to buy. A number of items were included in both the teachers' and students' questionnaires to find out whether and how they accomplish these duties and the criteria they use.

The 47.9% of the students who in table 12 said they possessed auxiliary books, were required by the same item to state who recommended their auxiliary books for them. The responses appear on table 12.

TABLE 12: STUDENTS' RESPONSES AS TO WHO RECOMMENDED THEIR AUXILIARY CHEMISTRY BOOKS

Respondents	Teacher		Parent		Other party	
	NO.	%	NO.	%	NO.	%
Male	6	17.65%	3	8.8%	5	14.7%
Female	14	41.2%	6	17.65%	-	-
Total	20	58.85%	9	26.45%	5	14.7%

The table shows that more than 40% of the respondents acquire their auxiliary books through non-teacher recommendation. These include parents, friends etc. who may not be conversant with the requirements of the course offered in school. It also appears that the female respondents are more suggestible than males.

To confirm if teachers did infact recommend auxiliary books for their students, an item was included in their questionnaire for that purpose. Their responses are given in table 13.

TABLE 13: TEACHERS' RESPONSES AS TO WHETHER THEY HAD RECOMMENDED AUXILIARY BOOKS TO STUDENTS

Respondents	Yes		No	
	No.	%	No.	%
Male	1	11.1%	3	33.33%
Female	1	11.1%	4	44.44%
Total	2	22.2%	7	77.8%

As seen from this table 77.8% of the teachers that responded did not recommend books for their students. It would appear that most teachers are rather cautious over the issue of recommending books.

Under the same objective an item was included in the teachers' questionnaire to find out the criteria they use when selecting auxiliary books for themselves or recommending the same for their students. The various responses they gave were grouped into the following categories:

1. Content as related to syllabus
2. Cost of the book
3. questions and experiments
4. level of students' understanding
5. binding of the book

Table 14 gives the breakdown of the responses as percentages.

TABLE 14: CRITERIA USED BY TEACHERS TO SELECT AUXILIARY BOOKS.

Criteria	Appropriate content		Cost		Questions and Experiments		Level of students understanding		Binding	
	No.	%	No.	%	No.	%	No.	%	No.	%
Male	3	27.3%	1	9.1%	2	18.2%	1	9.1%	1	9.1%
Female	2	18.2%	1	9.1%	-	-	-	-	-	-
Total	5	45.5%	2	18.2%	2	18.2%	1	9.1%	1	9.1%

A total of eleven criteria were registered of which 45.5% were based on the content of the books.

The researcher also felt that it is essential for teachers to be aware of the machinery and guiding criteria for recommending school books. An item was therefore included in the teachers' questionnaire to investigate this.

Table 15 shows the responses.

TABLE 15: TEACHERS' RESPONSES AS TO WHETHER THEY KNEW PROCEDURES FOR RECOMMENDING SCHOOL BOOKS IN KENYA

Responses	YES		NO	
	NO.	%	NO.	%
Male	-	-	4	40%
Female	-	-	6	60%
Total	-	-	10	100%

The table shows that virtually all the teachers who responded were not aware of the procedure and criteria for recommending school books in Kenya.

D. USE OF CHEMISTRY BOOKS IN THE TEACHING-LEARNING PROCESS OF THE NEW COURSE

Both text and auxiliary books may be used in various ways to foster the teaching and learning of chemistry. A number of items were included in the teachers' and students' questionnaires to investigate how and why they used the books at their disposal.

One of the items in the teachers' questionnaire required the teachers to state whether the books they used with the former course were still useful for the new chemistry course. They were also required to specify how these books are still useful to them. All the teachers indicated that the old books are still useful for the new course. They gave various reasons which were divided into 4 broad categories as follows:

1. there were those who valued the content or information in these books.
2. there were others who valued the experiments
3. others found the books useful for setting assignments for students.
4. there were some who gave reasons other than those above.

Table 16 shows the responses as percentages.

TABLE 16: TEACHERS' REASONS FOR KEEPING FORMER TEXTBOOKS

Reason	Useful content		Useful experiments		Setting Assignments		Other	
	No	%	No	%	No	%	No.	%
SSP Course	-	-	2	20%	-	-	-	-
Traditional course	4	40%	1	10%	1	10%	2	20%
Total	4	40%	3	30%	1	10%	2	20%

The table shows that 40% of the teachers, who valued the content, were those from schools that formerly offered the traditional course, while two-thirds of those teachers who valued experiment of the former books were those from schools that formerly offered the SSP course.

Under the same objective an item was included in the students' questionnaire to investigate those students who possessed auxiliary books preferred them to their present textbooks. Their responses are shown in table 17.

TAPLE 17: ASSESSMENT OF STUDENTS' PREFERENCE FOR THEIR AUXILIARY BOOKS

Response	YES		NO	
	NO.	%	NO.	%
Male	13	38.2%	1	2.9%
Female	16	47.1%	4	11.8%
Total	29	85.3%	5	14.7%

The table shows that 85.3% of the students who possessed auxiliary books liked them more than their textbooks.

Under the same item the students who preferred their auxiliary books were asked to give reasons for their preference. Their responses fell into 4 broad categories as follows:

1. some found their auxiliary books containing more information compared to their textbooks.

2. others said the explanations in their auxiliary books were better.

3. others found the language simpler in their auxiliary books.

4. another group gave some other reasons different from these.

Table 18 gives the responses as percentages.

TABLE 18: STUDENTS' REASONS FOR PREFERRING THEIR AUXILIARY BOOKS

Reason	More Information		Better Explanation		Simpler Language		Other	
	NO.	%	NO.	%	NO.	%	NO.	%
Male	7	20.6%	5	14.7%	3	8.8%	1	2.9%
Female	10	29.4%	4	11.8%	2	5.9%	2	5.9%
Total	17	50%	9	26.5%	5	14.7%	3	8.8%

The table shows that 50% of the students who possessed auxiliary books prefer more informative and descriptive books.

Under the same objective the researcher sought to investigate the usefulness of making notes in the teaching-learning process. This remains a controversial issue and no definite answers seem to exist for questions like, how much should the student copy from the textbook? or how much should the teacher write on the board for the student to copy? should notes be dictated? etc. An item was included in the students' and teachers' questionnaires to find out their views regarding the usefulness of making notes especially from textbooks. Their responses are presented in table 19.

TABLE 19: TEACHERS' AND STUDENTS' VIEWS REGARDING THE ESSENCE OF MAKING NOTES

Respondents		Very Essential			Essential			Less Essential			Not Essential		
		Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Teachers	No	1	3	4	2	1	3	1	1	2	-	-	-
	%	11.1%	33.3%	44.4%	22.2%	11.1%	33.3%	11.1%	11.1%	22.2%	-	-	-
Students	No	27	10	37	15	10	25	2	2	4	3	3	6
	%	37.5%	13.9%	51.4%	20.8%	13.9%	34.7%	2.8%	2.8%	5.6%	4.2%	4.2%	8.3%

The table shows that 44.4% of the teachers and 51.4% of the students consider making notes to be very essential in the process of teaching and learning chemistry.

Since making notes is considered so important by teachers and students, conscious efforts should be made by teachers to train their students in the art of making good notes from their text and auxiliary books so that students do not reproduce whole sections of the books in their note-books. To investigate this an item was included in the teachers' questionnaire requiring them to state the method they use to train their students to make good notes from their books. The various methods mentioned by the teachers were

grouped into 4 main categories as follows:

1. some teachers were in favour of students making notes from their textbooks or from the teachers dictation.

2. some others gave short summary notes to be completed by students using their textbooks.

3. others said they gave summary questions which would be answered by students thereby constituting their notes.

4. There were also those who encouraged their students to make notes from the experiments they did.

These are summarised by table 20.

TABLE 20: METHODS USED BY TEACHERS TO TRAIN THEIR STUDENTS TO MAKE GOOD NOTES USING TEXTBOOKS

Method	Textbook Notes or Dictation		Short Summary Notes		Summary Questions		Experimental write-up	
	No.	%	No.	%	No.	%	No.	%
Male	-	-	2	22.2%	1	11.1%	1	11.1%
Female	2	22.2%	2	22.2%	-	-	1	11.1%
Total	2	22.2%	4	44.4%	1	11.1%	2	22.2%

It is noted that only 22.2% of the teachers admit encouraging their students to copy their notes from textbooks or dictate such notes to them.

A similar investigation was done on the students to find out the methods their teachers use to help them make good notes using their textbooks. Their responses were grouped into 3 broad categories as follows:

1. there were those who said their teachers simply told them to make notes from their textbooks thereby receiving no help at all.

2. others said their teachers offered some help by giving either short notes or summary questions which the students would use to make notes.

3. some said they made notes from the experiments.

The responses are summarised by table 21.

TABLE 21: STUDENTS' RESPONSES ABOUT METHODS THEIR TEACHERS USE TO HELP THEM MAKE GOOD NOTES USING TEXTBOOKS

Responses	No help by teachers		Some help by teachers		Experimental write-up	
	No.	%	No.	%	No.	%
Male	40	60.6%	5	7.6%	-	-
Female	4	6.1%	10	15.1%	7	10.6%
Total	44	66.7%	15	22.7%	7	10.6%

The table shows that 66.7% of the teachers give no help to students to make good notes from their textbooks. This seems to contradict the teachers' response on table 20.

The researcher also sought to find out the adequacy of the textbooks in organising practical work. An item was included in the teachers' questionnaire for this purpose and their responses appear in table 22.

TABLE 22: TEACHERS' OPINION REGARDING THE ADEQUACY OF TEXTBOOKS FOR ORGANISING CLASS PRACTICAL WORK

Respondents	Quite Adequate		Reasonably Adequate		Inadequate	
	No.	%	No.	%	No.	%
Male	1	11.1%	2	22.2%	1	11.1%
Female	1	11.1%	1	11.1%	3	33.3%
Total	2	22.2%	3	33.3%	4	44.4%

It is noted that although the majority of the teachers find their textbook to be adequate for organising practical work, as many as 44.4% feel their textbooks are inadequate in this respect.

Another related item in the teachers' questionnaire sought to establish how useful the chemistry textbook is for setting informal tests in chemistry. The results are shown in table 23.

TABLE 23: TEACHERS' OPINION REGARDING THE USEFULNESS OF TEXTBOOKS IN SETTING TESTS IN CHEMISTRY

Source of Question	Textbook		Past papers		Others	
	No.	%	No.	%	No.	%
Male	2	13.3%	2	13.3%	1	6.7%
Female	3	20%	4	26.7%	3	20%
Total	5	33.3%	6	40%	4	26.7%

The table shows that the textbook is not the most useful source of questions for tests although 33.3% of the teachers use it for that purpose.

To round off this objective an item was included in the teachers' and students' questionnaires to establish how much they agreed with a suggestion that students should not be allowed to keep their textbooks on the grounds that they usually get confused by reading ahead. The responses are shown in table 24.

TABLE 24: OPINION OF TEACHERS AND STUDENTS AS TO WHETHER STUDENTS SHOULD NOT KEEP TEXTBOOKS

Respondents	Strongly Agree		Partly Agree		Strongly Disagree		Other	
	No.	%	No.	%	No.	%	No.	%
Teachers	-	-	4	44.4%	4	44.4%	1	11.1%
Students	4	5.7%	18	25.7%	45	64.3%	3	4.3%

The table shows that whereas the teachers are not definite in their opinion, 64.3% of the students strongly disagree with the suggestion. This emphasizes how valuable the textbook is to the students. All the students investigated agreed that they do benefit by keeping the textbook with them.

E. QUANTITATIVE ANALYSIS OF SOME CHEMISTRY BOOKS USED IN SCHOOLS

The most fundamental feature of the new chemistry course is the emphasis of the 'activities approach' in which students are active participants in the process of learning chemistry. The most appropriate books for the course therefore are those which apart from providing basic chemical information contain as well, a high proportion of activities for students.

To establish how the various chemistry textbooks currently used by schools satisfy this requirement, a rating sheet was supplied to the teachers in which they were required to enter the calculated indices of involvement for the various components of their textbooks. For each textbook the following components were rated as detailed in chapter 2.

(a) the text
(b) figures and diagrams
(c) questions at end of chapters
(d) chapter summaries.

Table 25 is an example of how the rating sheet was filled for text analysis of one of the books investigated.

TABLE 23: SAMPLE RATING SHEET FOR TEXT ANALYSIS

THE RATING SHEET

NAME OF BOOK ..A..NEW..CERTIFICATE..CHEMISTRY.....
By Holderness + Lambert 5th Edition.

A.TEXT ANALYSIS

Number of page analysed	2	57	108	161	214	267	320	373	426	479	TOTAL
a. facts											198
b. conclusions					1	1					7
c. definitions				1			1				9
d. questions asked but answered immediately											—
e. questions requiring student to analyse data.											—
f. statement requiring student to formulate conclusion.											—
g. directions to student to perform and analyse activity.											20
h. question to arouse student interest:not answered immediately											—
i. sentence directing student to figure; not fitting above categories.											16
j. rhetorical question.											—

Overall Involvement Index for Text

Total $\frac{e+f+g+h}{a+b+c+d}$ = $\frac{20}{214}$ = .09

This analysis was completed for 5 of the books met in the schools investigated. Table 26 presents only the indices for text analysis of these books.

TABLE 26: INDICES OF STUDENT INVOLVEMENT FOR THE TEXT OF SOME CHEMISTRY BOOKS USED IN SCHOOLS

BOOKS	Chemistry: A New Certificate Approach Bajah & Godman	A New Certificate Chemistry Holderness and Lambert	Certificate Chemistry Atkinson	Chemistry for Today and Tomorrow Allerton and Lawrence	Investigating Chemistry. Davies et al
Indices of Involvement	0.04	0.09	0.29	0.45	1.31

The table shows that the books that were formerly used by most schools as textbooks e.g. A New Certificate Chemistry by Holderness and Lambert, Certificate Chemistry by Atkinson, and Chemistry: A New Certificate Approach by Bajah and Godman, Score indices much lower than 0.4. Therefore it can be concluded that these books give very little challenge to students and only encourage memorization of facts and definitions. On the other hand the 0.45 index scored by Chemistry for Today and Tomorrow shows that the authors have included more information and proposed fewer activities.

It has been pointed that Investigating Chemistry by Davies et al is the only suggested book which had been acquired by some schools as their textbook. The 1.31 index suggests that this book contains materials relevant to the approach envisaged in the new syllabus.

F. USE OF LIBRARY FACILITIES

A library well stocked with relevant chemistry books is an asset in the teaching and learning of chemistry. To investigate the availability and use of library facilities, a number of items were included in both the teachers' and students' questionnaires to which they responded.

According to the responses to one item in the students' questionnaire, all the schools investigated had a library.

The other item required the students to indicate how frequently they made use of the library facilities. Their responses are shown in table 27.

TABLE 27: FREQUENCY OF USE OF SCHOOL LIBRARY FACILITIES BY STUDENTS

Responses	Very Frequently		Frequently		Occasionally		Very Rarely	
	No.	%	No.	%	No.	%	No.	%
Male	1	1.4%	11	15.3%	13	18.0%	22	30.6%
Female	-	-	6	8.3%	11	15.3%	8	11.1%
Total	1	1.4%	17	23.6%	24	33.3%	30	41.7%

The table shows that a total of 75% of the students investigated do not take the library facilities seriously.

The next part of the item sought to find out the students' opinion about the relevance of the chemistry reference books in their school library. Their responses are presented in table 28.

TABLE 28: STUDENTS' RESPONSES TO WHETHER THE CHEMISTRY REFERENCE BOOKS IN THEIR SCHOOL LIBRARIES ARE RELEVANT TO NEW COURSE

Response	YES		NO		A FEW	
	No.	%	No.	%	No.	%
Male	13	18.1%	10	13.9%	24	33.3%
Female	15	20.8%	1	1.4%	9	12.5%
Total	28	38.9%	11	15.3%	33	45.8%

It is significant that 84.7% of the students admitted that their school libraries have at least some relevant chemistry book and only a small 15.3% responded to the contrary.

CHAPTER 4

SUMMARY AND CONCLUSIONS

4.1 SUMMARY

Since the new chemistry course puts alot of emphasis on student involvement in the process of learning chemistry, relevant books for the course are those that challenge students to take an active part in the process of learning chemistry. This study therefore set out to investigate the relevance of those books that were suggested to be used for teaching the new course in chemistry. A number of issues relating to the selection and use of books were also investigated.

The study specifically addressed itself to the following questions:

Do chemistry teachers appreciate the changed emphasis in the new chemistry syllabus?

What mechanisms exist now for the selection of secondary school textbooks in Kenya?

Are these mechanisms functional?

Are teachers aware of the criteria for selecting textbooks?

Are there sufficient chemistry textbooks for each child in the schools?

Which of the suggested textbooks is most common in schools?

How suitable are the suggested books for the new syllabus?

How useful is the textbook in the teaching and learning of chemistry?

Should the textbooks be supplied to students or should they be confined solely with the teacher?

The study used the survey method in which random sampling was applied both in selecting schools and the subjects. The latter comprised mainly of chemistry teachers and form 3 students from each of the sample schools.

Information was gathered from the subjects using questionnaires. In conjunction with these questionnaires, a quantitative analysis of some common books was also done using an adopted rating sheet.

The questionnaire responses were analysed under five broad objectives. In each case the number of respondents was computed and converted into percentages then tabulated. The percentages were then interpreted and from them conclusions about the study were made. The rating sheets made it possible to calculate indices for various components of a book. From those indices conclusions were made about the relevance of that particular book for the new syllabus.

4.2 CONCLUSIONS

With regard to the questions raised in chapter I and in the light of the data collected and analysed in chapters 2 and 3 respectively, a number of conclusions can be made from the study.

As for the recommendation and selection of chemistry textbooks it was established from KIE that the authority to recommend books for Kenyan schools is still vested with the professional subject panels at KIE. In recommending books the panels follow established guidelines which set out criteria to be used in the selection process. These criteria vary with the subject, educational level and age of the students for which the books are intended. Once recommended the books must then get the approval, not only of the Course Panel and Academic Board at KIE, but also that of the Chief Inspector of Schools. Only then can the books be supplied to schools.

The Presidential intervention in 1982 produced a slight modification of this procedure for some social science subjects e.g. History, Literature etc. Books for these subjects will be selected normally by the KIE panels but, in addition, such books will be subjected to more stringent scrutiny against certain socio-political criteria, and will require 'clearance' from higher authorities in the Ministries of Education before they can be released to schools.

The study however, revealed that in spite of the existence of the procedure and criteria for recommending and selecting books, 100% of the teachers investigated did not know such procedure let alone the criteria for the selection. The teachers own criteria for selecting their auxiliary books was found to be rather limited, as is seen in table 14 , 45.5% of the teachers merely check if the content of the book conforms to that of the syllabus; other factors like approach, organisation etc. do not seem to be of importance to most teachers in their selection. No wonder, therefore, that 77.8% of the teachers in table 13, refrained from recommending auxiliary books for their students. This might also explain why, in table 12, 41.2% of the students rely on people other than their teachers to recommend books for them to buy.

With regard to the acquisition of the suggested books, the study found that, of the 6 suggested books, only 3 were encountered in the schools investigated. Table 8 shows that out of these 3, only one: Investigating Chemistry by Davies et al, had been acquired by 25% of the schools as their textbook. The other 25% of the schools were found to continue using their former textbooks; while the rest of the schools used some other books. This shows clearly that there is no uniformity in the type of books used in implementing the new course, and there is a definite reluctance by teachers to acquire the suggested books. In order to know the books suggested, it was necessary that the teachers received the course outline from the Inspectorate and read the list of books printed at the back. Only then would they decide whether to acquire them if funds were available. Table 5 shows that a significant 37.5% of the schools did not have the Course Outline and teachers in these schools could not be aware of the suggested books; but as seen in table 9, possessing the Course Outline and reading the list is not in itself a guarantee that the teachers would acquire any of the suggested books.

Since only 35.3% of the schools had acquired one suggested book, it was decided that the quantitative analysis be done of any of the books that were found used in schools so that their relevance for the new course could be established. Table 26 shows that some of the most favourable books with students and teachers, score indices less than 0.3, meaning that they are not the most suitable for the course. On the other hand, with an index of 1.31, the suggested book appears to be just right for the course. (It would have been interesting to compare all the 6 suggested books on a rank order based on their indices).

Chemistry for Today and Tomorrow with an index of 0.45 is a borderline case and should be used with caution; however it is safe to conclude that most of the books used in schools to implement the course are not relevant.

Relevance aside, however, it is important that students should have access to, at least, some chemistry book to use in class or privately. The study revealed that this is not always the case as seen in tables 10 and 11. 57.7% of the students in Government Maintained schools share textbooks, and an equal number do not possess any auxiliary chemistry book. In contrast all students in the other categories of schools had a textbook each thereby being better supplied than those in Maintained schools.

In the process of learning chemistry, students need to be exposed to a wide variety of resource materials that a well stocked library should provide. If such materials are relevant and properly used, they do greatly assist this process. However, according to table 27, 75% of the students do not use the library facilities frequently despite their admission, in table 28, that their school libraries do contain relevant materials. The library therefore, seems to be an underutilized facility in most schools. Hence the lack of books is not very much alleviated by the presence of a library.

Possessing a chemistry book per se is of no importance unless teachers and students know how to make proper use of such a book. There are a number of ways in which a chemistry book may be used e.g. for reference and making notes, as a guide to the kind of practical work to do and how to conduct them, and as a source of questions for tests and assignments etc. According to table 22, 44.4% of teachers find that their textbook is inadequate for organising class practical work. Table 23 also shows that the textbook is not the most important source of questions for tests and assignments. On the other hand table 19 shows

that 77.7% of teachers and 86.1% of students agree that making notes is very essential to learning chemistry. However they do not concur on the methods teachers use to train students to make good notes from their textbooks; for while only 22.2% of the teachers admit using methods that do not assist students to learn making notes, 66.7% of the students think otherwise. These are indicated on tables 20 and 21 respectively.

From the foregoing it appears that, for teachers and students, the major role of the textbook in the teaching-learning process is that of providing information. But whatever the misgivings of the textbook table 24 shows that 44.4% of teachers and 64.3% of students would not let the student part with his textbook.

The successful implementation of the new course is, however, not possible unless the teachers adopt a favourable attitude to it and become committed in applying some of the new techniques suggested in the course. The study, however, revealed that the new syllabus was not received well by the majority of the teachers. As seen from table 6, only 20% of the teachers thought the new course was any better than the former. The rest were not impressed at all.

This subtle resistance is reflected in other areas as well e.g. it was seen in table 8 that 75% of schools did not see the need of acquiring the suggested books and 25% of them even continued with their former textbooks. In table 16, the reason given by 40% of the teachers for keeping their former textbooks is that they have valuable content. It is noted in table 18 that 50% of the students who possess auxiliary books gave a similar reason for preferring their auxiliary books. It is also significant that 76.5% of those students who possess auxiliary books agree that these are books that were used as texts in the former course. It may therefore be concluded that there

is an evident large inertia on the part of the chemistry teachers to adopt the syllabus, and a continued preference, by teachers and students, for books that are merely informative.

4.3 DISCUSSION

From the findings and consequent conclusions a number of explanations may be adduced for the various issues underlying the study.

Firstly, with regard to the recommendation and selection of books the findings expose lack of basic knowledge on the part of teachers of the procedures and criteria for the recommendation and selection. Presently these are confined within KIE, very much out of reach of the majority of practicing teachers with the exception of those selected few who participate in panel meetings at K.I.E.

This is unfortunate in view of the fact that teachers are ipso facto opinion leaders in several matters on education including what books to use in school. They should be able to objectively select books not only for themselves but also recommend to students those books that are suitable for a particular course, since they are more aware of the requirements of such courses. If they abdicate this role to other parties they fail themselves as well as their students.

The reluctance by teachers to acquire the suggested books could be the result of various factors e.g. the unawareness of the existence of such books due to lack of the Course Outline. The cost of the books could constitute another factor in view of the limited financial resources of most schools, this could also explain the scarcity of textbooks in Government Maintained Schools where students have to share textbooks. The other factor could well be the negative attitude of most of the teachers to the new courses

an attitude that must have influenced their response to the suggested changes, therefore they perhaps did not bother about the suggested books at all. As a result of these, one finds various different books used in schools to teach the new course so that there is no uniformity in the implementation of the course with regard to textbooks.

Closely related to the teachers' reluctance to acquire suggested books is their continued preference for the more informative and descriptive books. This may be explained from the fact that, by suggesting changes in methods of teaching, especially its stress on inquiry techniques, the new course called for more creativity and resourcefulness on the part of the teachers e.g. in their choice and use of resource materials to teach the course. It is however known that once a teacher has established a personal style of teaching it becomes difficult to change from that style. If it comes at all, the change involves a gradual and slow transition from the old methods through a mixture of the old and new, before the new methods can be fully acquired. This process takes time and needs constant practice. Since the teacher is the agent of change it can be expected that the habits of students will take longer to change.

With regard to the use of the textbook in the teaching-learning process two aspects are discussed here viz: its use in making notes and its role in practical work.

The most common way in which teachers tell their students to make notes from their textbooks is summarized by the following response to an item in one of the questionnaires:

> "You read, understand and make notes, not publishing the whole book."

Unfortunately students, not knowing what and how much to copy from the book, usually end up just re-printing the textbook. It is agreed however, that making notes from a textbook is not easy and usually requires very specific skills. A number of steps are involved in making good notes from a textbook e.g. reading the text with understanding, extracting pertinent information, then re-writing the information in one's own words. These skills are not easy to acquire and it is futile to expect students to possess them automatically especially in Form one.

Although the new course is laboratory, and not textbook, centred, the latter may facilitate or frustrate proper learning using the laboratory. Previously instructions for practical work were contained either in separate laboratory manuals or as part of the textbook. Such instructions are invariably routine and of a stereotype nature. All the required details are presented and the only thing left for the student to do is verify or confirm what the manual or the text says. Often the student feels a sense of failure and disappointment when his result differs from that expected in the manual. Very little room is left for the student to reason and generalise from his observations. It is obvious that manuals and textbooks with practicals of this form should be out of question for the new course.

4.4. RECOMMENDATIONS

In the light of the preceding discussion it is suggested that:

(i) There is need to decentralise the procedure for recommending books to the school level so as to involve all the teachers. In this way the teachers will be made aware of the criteria that are used in selecting books.

(ii) There is need to conduct a more exhaustive evaluation of the new chemistry course to establish the extent to which its objectives are being met and the kind of problems hindering its successful implementation. For instance, it is apparent that there is an urgent need to train the teachers on the rudimentary techniques of inquiry in order for them to cope with the open-endedness of this method, and also be able not only to organise but also evaluate the experiences of inquiry. This should be done in the training institutions as well as for those teachers in the field. The evaluation would also establish whether the course outline provides sufficient guidance for the Chemistry teacher.

(iii) The responsibility of buying textbooks in Government Maintained Schools should perhaps be transferred to the parents as is the case in the other categories of schools. Although this would entail further financial expenses, the benefits would perhaps more than compensate for the costs.

(iv) In order to help their students learn how to make notes from textbooks teachers need to train the students to acquire the necessary skills. This may be done in liaison with the relevant department of languages in a school. In the process, the student should be helped to think through what was taught in class. The teacher may achieve this by providing the 'skeleton' in the form of short summary notes or questions, then guiding the students on how to fill in the 'meat' using the textbook. The questions, for instance, should be such that their answers are not obvious from the textbook. Such answers, now in notes form, should be checked,

discussed and graded, and could well form the basis of continuous assessment.

(v) There is also a need to compile laboratory manuals that allow for more inductive reasoning and generalization by students.

APPENDIX 1

QUESTIONNAIRE FOR TEACHERS

The purpose of this questionnaire is to find out the textbooks used and how relevant they are for the new chemistry syllabus that was recently adopted in some secondary schools in Kenya.

Please take your time and fill it as completely and faithfully as possible.

Put a tick ☑ where necessary.

DO NOT WRITE YOUR NAME.

SECTION A: THE SCHOOL

1. Name of School .....
.....

2. Type of School

(a) Government School ☐

Government Aided School ☐

Unaided Community School ☐

Private School ☐

(b) Boys' School ☐

Girls' School ☐

Mixed School ☐

(c) Day School ☐

Boarding School ☐

(d) 'O'Level only ☐

'O' and 'A' level ☐

SECTION B PERSONAL

3. Sex

Male ☐ Female ☐

4. Qualifications .....
.....
.....
.....

5. Teaching Experience (Chemistry)
.....
.....yrs.

6. Other Subjects taught,apart from chemistry.

Physics ☐ Biology ☐

Mathematics ☐ Other ☐

specify .....

7. Which classes do you take for chemistry now?
.....
.....

8. How many periods of chem istry do you teach per week?

.....

9. How many other chemistry teachers are there in the school?

.....

10. Do you have any other responsibilities in the school apart from teaching?

Yes ☐ No ☐

if yes, specify .....
.....
.....

SECTION C: CHEMISTRY COURSE

11. Which chemistry course was offered by the school prior to the introduction of the present new syliabus?

SSP only ☐

SSP and Physical Science ☐

Traditional only ☐

Traditional and Physical Science ☐

12. What is your impression of the new course compared to the former one?

.....
.....
.....
.....
.....

13. All schools offering the new chemistry course were supplied with a copy of the new syllabus plus a course outline. Which of these two documents do you have?

Both ☐

only one ☐ Specify .....

None ☐

14. How useful is the course outline (if you have it) in the teaching of the new chemistry syllabus?

very useful ☐ useful ☐

limited use ☐ not useful ☐

15. Which book(s) did the school use as class texts for the former chemistry course in

(a) Form II? .....
.....
.....

(b) Form III?.....
.....
.....

16. Are these old text-books still useful to you in the teaching of the new course?

Yes ☐ No ☐

if yes, state how
they are useful .....
.....
.....

17. A list of books deemed to be useful in the teaching of the new chemistry course is given at the end of the course outline. Have you ever read this list?

(a) Yes ☐ No ☐

(b) Which of the books suggested in the course outline have you acquired for use as class textbooks?

.....
.....
.....
.....
.....

18. In case item number 17 does not apply please indicate the chemistry book(s) you use now as class texts in.

(a) Form II .....
.....
.....
.....

(b) Form III.....
.....
.....
.....

19. How many students share each copy of the text book in

(a) Form II?		(b) Form III?	
One.	☐	One	☐
Two	☐	Two	☐
Three	☐	Three	☐
Other	☐	Other	☐
Specify.....		Specify.....	

20. Give a list of other auxiliary chemistry books (if any) that you use in teaching the new course.

.....
.....
.....
.....
.....

21. Have you recommended other auxiliary chemistry books for your students?

(a) Yes ☐ No ☐

(b) if yes, give the name of two such books?

....
....

22. What criteria do you use in choosing auxiliary books as mentioned in items 20 and 21 above?

.....
.....
.....
.....
.....
.....

23. Are you aware of the procedure for recommending school books in Kenya?

Yes ☐ No ☐

if yes please specify the procedure

.....
.....
.....
.....
.....

24. If you are aware of the procedure for recommending books in Kenya, what is your opinion about this procedure? It is:

very good ☐

satisfactory ☐

Poor ☐

25. How relevant do you consider the chemistry resource materials in your school library for the teaching of the new chemistry course?

very relevant ☐ relevant ☐

little relevance ☐ not relevant ☐

Other ☐ specify .....
.....

26. Making notes is one of the very difficult exercises for teachers and students. How essential, in your opinion, is notes taking to the process of teaching and learning chemistry, especially the new course?

very essential ☐ essential ☐

less essential ☐ not essential ☐

Other ☐ specify .....
.....

27. What method do you use to train your students to be able to make good notes using their text-books?

.....
.....
.....
.....
.....

28. Comment on the adequacy of the chemistry textbook for organising class practical work.

quite adequate ☐ reasonably adequate ☐

inadequate ☐ completely inadequate ☐

29. When setting informal chemistry tests the questions for such tests are often drawn from:

text book ☐ Past papers ☐

other sources ☐ specify .....
.....

30. Some teachers feel that students should not be allowed to keeptext books with them as they(students) usually read 'too much' ahead and in the process, they confuse themselves. What is your reaction to this view?

strongly agree ☐ partly agree ☐

strongly disagree ☐ other ☐

Specify .....
.....
.....

31. Please give any other comments about the chemistry textbook e.g. mention if the book meets the objectives of the course; the level of difficulty of the book; and any other factors bearing on the classroom situation.

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THANKS ALOT FOR YOUR HELP.

APPENDIX II

QUANTITATIVE ANALYSIS OF CHEMISTRY TEXTBOOKS

The following is a sample rating sheet that may be used to analyse, quantitatively, any science textbook or laboratory manual. It is intended to check if the chemistry textbooks suggested for use with the new chemistry syllabus do encourage student involvement in the process of learning chemistry as required by the new chemistry course.

Incase your school has none of the suggested books then use the sheet to analyse the chemistry book that you are using as the class text for chemistry.

INSTRUCTIONS:

You are requested to read the following instructions carefully then complete the five corresponding sections on the rating sheet. You may find it easier to complete each section immediately after reading the instructions on that section.

A. Rating the Text.

1. Randomly select and mark about ten text pages from the various parts of the book.

2. Read a block of twenty - five sentences on each of the marked pages and assign each sentence to one of the categories listed below. (If one page contains fewer than twenty-five sentences of normal text, continue on to the next page). Do not include headings, figure captions, equations, summary questions, or chapter introductions in your sample.

Begin with the first new paragraph on the page. Your sample may thus span parts of more than one section.

Categories:

a. Statements of fact. A statement of fact is defined for this purpose as a simple statement presenting a piece of data or an observation made by someone other than the student. e.g. 'When hydrochloric acid is placed on calcite a reaction takes place in which carbon-dioxide is produced.'

b. Stated conclusions or generalizations. A conclusion is defined here as the author's stated opinion about the meaning of or the relationships between items in a series of facts. e.g. 'From their physical characteristics we conclude that whales are mammals'

c. Definitions.

d. Question asked but answered immediately by the text.

e. Questions requiring the student to analyse data.

f. Statements requiring the student to formulate his own conclusion.

g. Directions telling the student to perform and analyse some activity; statements posing problems to be solved by the student.

h. Questions that are asked to arouse student interest but are not answered immediately by the text.

i. Sentences directing the reader to look at a figure; procedural instructions in activities; sentences not fitting any of the above categories.

j. Rhetorical questions. These are questions asked for the sake of effect, to impress people, no answer being needed or expected.

3. Calculate the index of student involvement for the text from:

$$\frac{e+f+g+h}{a+b+c+d}$$

B. Rating the Figures and Diagrams in the Text.

1. Randomly select ten figures or diagrams in the book.

2. Analyse each figure or diagram and assign it to one or more of the following categories.

a. Used strictly for illustrative purposes.

b. Requires students to perform some activity or to use data.

c. Illustrates how to set up the apparatus for an activity.

d. Fits none of the categories above.

3. Calculate the index of student involvement for the figures and diagrams from:

b/a

C. Rating the Questions at the end of Text Sections and chapters.

1. Randomly select ten questions at the ends of ten different chapters.
2. Assign each question to one of the following categories:
   (a) Answer can be obtained directly from the text.
   (b) Definition.
   (c) Question requires the student to apply learnings from the chapter to new situations.
   (d) Question requires the student to solve a problem.
3. Calculate the index of student involvement for the questions from:

$$\frac{c+d}{a+b}$$

D. Rating the chapter summaries (if any)

1. Select the chapter summaries from three different chapters.
2. Read two paragraphs of each of the three chapter summaries and assign each sentence to one of the following categories.

(a) Repeats the conclusions of the chapter

(b) Raises new questions, the answers to which are not available in the text or are subjects of current research in science.

3. Calculate the index of involvement for the summaries from:

b/a

E. Determining an activities index for the book

Select at least ten pages at random and glance through each, assigning an index as follows: count the number of proposed activities required of the students. To get an index number, divide the proposed activities found by the number of pages examined.

THE RATING SHEET

NAME OF BOOK .....

.....

A.TEXT ANALYSIS

Number of page analysed											TOTAL
a. facts											
b. conclusions											
c. definitions											
d. questions asked but answered immediately											
e. questions requiring student to analyse data.											
f. statement requiring student to formulate conclusion.											
g. directions to student to perform and analyse activity.											
h. question to arouse student interesting answered immediately											
i. sentence directing student to figure; not fitting above categories.											
j. rhetorical question.											

Overall Involvement Index for Text.

Total $\frac{\text{a+f+...+h}}{\text{a+f+...+j}}$ =

B. FIGURE AND DIAGRAM ANALYSIS

Number of figure analysed											
a. illustration only b. requires student to perform activity and use data.											
c. illustrates way of setting up apparatus for activity.											
d. fits none of above											

Overall Index for Figures

Total b/a=

C. ANALYSIS OF QUESTIONS AT CHAPTER ENDS

Question number											TOTAL
a. answer in text											
b. definition											
c. requires student to apply learning to new situation											
d. requires student to solve a problem											
e. fits none of the above.											

Overall Index for Questions.

Total $\frac{c+d}{a+b}$ =

D. ANALYSIS OF CHAPTER SUMMARIES

Chapter number										
a. repeats chapter conclusions.										
b. raises new questions.										

Overall Index
for Summaries
Total b/a=

E. ACTIVITIES INDEX

Page number										
a. number of activities Proposed per page										

Overall Index
for Activities
Total a/n=

(where n= total number
of pages examined).

THANKS ALOT FOR YOUR HELP.

APPENDIX III

QUESTIONNAIRE FOR STUDENTS

The purpose of this questionnaire is to find out the textbooks used and how relevant they are for the new chemistry syllabus that was recently adopted in some secondary schools in Kenya.

Please take your time and fill it as completely and faithfully as possible.

Put a tick ☑ where necessary.

DO NOT WRITE YOUR NAME.

SECTION A: THE SCHOOL

1. Name of School .....

.....

2(a) Boys' School ☐

Girls' School ☐

Mixed School ☐

(b) Day School ☐

Boarding School ☐

SECTION B: PERSONAL

3. Sex

Male ☐ Female ☐

4. Class

Form II ☐

Form III ☐

SECTION C: CHEMISTRY COURSE

5. Which book do you use now as the class text for chemistry?

.....

.....

.....

.....

6. How many students share each copy of the textbook?

one ☐ two ☐

Three ☐ other ☐

specify.....

.....

7. Do you have any auxiliary (personal) chemistry books apart from the class textbook?

(a) Yes ☐ No ☐

(b) if yes, state which one(s)

.....
.....
.....
.....
.....

8. If you do possess any auxiliary chemistry books,

(a) who recommended the books for you to buy (use)?

Teacher ☐ Parent ☐

Other ☐ specify ...
.....

(b) Do you prefer the auxiliary chemistry books to the class chemistry textbook?

Yes ☐ No ☐

if yes, give your reasons for the preference

.....
.....
.....
.....
.....

9. Does your school have a library?

Yes ☐ No ☐

10. If the answer to item 9 is yes,

(a) how frequently do you use the library facilities?

very frequently ☐ frequently ☐

occasionally ☐ very rarely ☐

(b) Does the library contain relevant reference materials for the new chemistry course?

Yes ☐ No ☐

a few ☐

11. Making notes is one of the very difficult exercises for students. In your opinion do you think making notes is essential for learning chemistry?

very essential ☐ essential ☐

less essential ☐ not essential ☐

12. State briefly the method your teacher uses to help you learn how to make good notes in chemistry especially from the textbook.....
.....
.....
.....
.....

13. For practical chemistry work your teacher normally uses examples from:

class textbook ☐

some other books ☐

14. When setting short class tests for continuous assessments and exercises in chemistry, your teacher normally uses.

class text book ☐

past papers ☐

other sources ☐

15. Some teachers feel that students should not be allowed to keep text books with them as they (students) usually read 'too much'ahead and confuse themselves in the process. What is your reaction to this view?

strongly agree ☐ partly agree ☐

strongly disagree ☐ other ☐

specify .....
.....

16. In your opinion what benefits do you achieve by keeping/not keeping the chemistry textbook with you?

.....
.....
.....
.....
.....
.....
.....
.....

17. Do you normally have enough time to use your chemistry textbook

(a) in class?

Yes ☐ No ☐

Why? .....
.....
.....
.....
.....
.....

(b) at your free time?

Yes ☐

No ☐

Why? .....
.....
.....
.....
.....
.....

18. Comment briefly on the difficulty level of your chemistry textbook. Do you find the language and the mathematics (if any) difficult?

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.....

any other comments about the text book?

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THANKS ALOT FOR YOUR HELP.

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